

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Art Unit: 1796 (Examiner: Irina Krylova)
Applicant/Appellant: Kraton Polymers U.S., LLC
Serial No: 10/589,705
Filed: February 12, 2007
Confirmation No. 9509
Title: FOAMABLE POLYMERIC COMPOSITIONS AND
ARTICLES CONTAINING FORAMED
COMPOSITIONS
Attorney Docket No.: L0010/US

Charlotte, North Carolina

Mail Stop: Appeal Brief - Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Dear Sir:

Appellant appeals from the rejection dated May 4, 2010 in which Claims 13-26 were rejected. The Notice of Appeal and associated fees were filed on July 19, 2010. The fees associated with the Appeal Brief accompany this paper. Thus, this Appeal Brief is timely filed.

Real Party In Interest

This application has been assigned to Kraton Polymers U.S. LLC

Related Appeals and Interferences

No related appeals or interferences are pending.

Status of Claims

Pending: Claims 13-26 are pending
Rejected: Claims 13-26 are rejected
Canceled: Claims 1-12 have been canceled
Objected to: None
Withdrawn: None
Appealed: Claims 13-26

Status of Amendments

No amendment to the claims or specification was filed after the response to Non-Final Office Action was mailed.

Summary of Claimed Subject Matter

a) Claim 13

Foamable compositions which are usable for the manufacture of foamed, flexible, heat resistant, thermoplastic elastomeric articles, and which comprise at least:	Under Paragraph 17, page 2, lines 1-4
100 parts by weight of one or more selectively hydrogenated block copolymers, having at least two resinous blocks A of non-hydrogenated predominantly polymerized monovinyl arene, and a selectively hydrogenated elastomeric block B, wherein said block B prior to hydrogenation being predominantly a polymerized conjugated diene of polybutadiene, said block copolymer having a total apparent molecular weight of at least 250 kg/mole, and containing polymerized monovinyl arene blocks of true molecular weight of at least 18 kg/mole,	Under Paragraph 18, page 2, lines 1-11
5 to 50 parts by weight of one or more selectively hydrogenated block copolymers having at least two resinous blocks A' of non-hydrogenated predominantly polymerized monovinyl arene, and an selectively hydrogenated elastomeric block B', wherein said block B' prior to hydrogenation has been derived from a polymerized conjugated diene or dienes as a major component which may be mixed with minor proportions of other copolymers (e.g. vinyl aromatic) i.e. ≤ 25 wt%, and said block copolymer having a total apparent molecular weight in the range of from 50 to 180 kg/mole, while the resinous blocks A' shown an true molecular weight in the range of from 3 to 20 kg/mole,	Under Paragraph 19, page 2, lines 1-14; Paragraph 25, page 2, lines 1-10
from 25 to 80 parts by weight of a linear crystalline polymer comprising propylene as major component, with a Vicat softening temperature in the range of from 130°C to 180°C and a MFR in the range of from 0.5	Under Paragraph 20, page 2, line 1-5; Paragraph 49, page 4, lines 1-5

to 30 dg/min and a polydispersity index of at least 4.5,	
from 100 to 250 parts by weight of a softener compatible with blocks B and B',	Under Paragraph 21, page 2, lines 1-2
from 0.01 to 3 wt%, relative to the weight of the primary components (a) up to (e) of a solid chemical nucleating agent of the endothermic group in combination with a blowing agent, and optionally	Under Paragraph 22, page 2, lines 1-4
one or more secondary components selected from PPO and/or any resins compatible with block copolymer component (a), antioxidants, UV-stabilizers, flame retardants, surface modifying agents and inorganic fillers.	Under Paragraph 23, page 2, lines 1-5

b) Claim 25

Foamed articles comprising	Under Paragraph 24, page 2, lines 1-2
100 parts by weight of one or more selectively hydrogenated block copolymers, having at least two resinous blocks A of non-hydrogenated predominantly polymerized monovinyl arene, and a selectively hydrogenated elastomeric block B, wherein said block B prior to hydrogenation being predominantly a polymerized conjugated diene of polybutadiene, said block copolymer having a total apparent molecular weight of at least 250 kg/, and containing polymerized monovinyl arene blocks of true molecular weight of at least 18 kg/mole,	Under Paragraph 18, page 2, lines 1-11; Under Paragraph 24, page 2, line 5
5 to 50 parts by weight of one or more selectively hydrogenated block copolymers having at least two resinous blocks A' of non-hydrogenated predominantly polymerized monovinyl arene, and an	Under Paragraph 19, page 2, lines 1-14; Paragraph 24, page 2, line 6; Paragraph 25, page 2, lines 1-10

selectively hydrogenated elastomeric block B', wherein said block B' prior to hydrogenation has been derived from a polymerized conjugated diene or dienes as a major component which may be mixed with minor proportions of other copolymers (e.g. vinyl aromatic) i.e. ≤ 25 wt%, and said block copolymer having a total apparent molecular weight in the range of from 50 to 180 kg/mole, while the resinous blocks A' shown an true molecular weight in the range of from 3 to 20 kg/mole,	
from 25 to 80 parts by weight of a linear crystalline polymer comprising propylene as major component, with a Vicat softening temperature in the range of from 130°C to 180°C and a MFR in the range of from 0.5 to 30 dg/min and a polydispersity index of at least 4.5,	Under Paragraph 20, page 2, line 1-5; Paragraph 24, page 2, lines 6-7; Paragraph 49, page 4, lines 1-5
from 100 to 250 parts by weight of a softener compatible with blocks B and B',	Under Paragraph 21, page 2, lines 1-2; Paragraph 24, page 2, line 7
from 0.01 to 3 wt%, relative to the weight of the primary components (a) up to (e) of a solid chemical nucleating agent of the endothermic group in combination with a blowing agent, and optionally	Under Paragraph 22, page 2, lines 1-4
one or more secondary components selected from PPO and/or any resins compatible with block copolymer component (a), antioxidants, UV-stabilizers, flame retardants, surface modifying agents and inorganic fillers.	Under Paragraph 23, page 2, lines 1-5

c) **Claim 26**

Pre-blends for the preparation of the foamable compositions of claim 13, comprising either	Under Paragraph 17, page 2, lines 1-4
components (a), (c) and (d) wherein (a) is	Under Paragraph 18, page 2, lines

<p>one or more selectively hydrogenated block copolymers, having at least two resinous blocks A of non-hydrogenated predominantly polymerized monovinyl arene, and a selectively hydrogenated elastomeric block B, wherein said block B prior to hydrogenation being predominantly a polymerized conjugated diene of polybutadiene, said block copolymer having a total apparent molecular weight of at least 250 kg/mole, and containing polymerized monovinyl arene blocks of true molecular weight of at least 18 kg/mole; (c) is a linear crystalline polymer comprising propylene as major component, with a Vicat softening temperature in the range of from 130°C to 180°C and a MFR in the range of from 0.5 to 30 dg/min and a polydispersity index of at least 4.5; and (d) a softener compatible with blocks B and B'; or</p>	<p>1-11; Paragraph 20, page 2, lines 1-5; Paragraph 49, page 2, lines 1-7</p>
<p>components (b), (c) and/or (d) wherein (b) is one or more selectively hydrogenated block copolymers having at least two resinous blocks A' of non-hydrogenated predominantly polymerized monovinyl arene, and an selectively hydrogenated elastomeric block B', wherein said block B' prior to hydrogenation has been derived from a polymerized conjugated diene or dienes as a major component which may be mixed with minor proportions of other copolymers (e.g. vinyl aromatic) i.e. ≤ 25 wt%, and said block copolymer having a total apparent molecular weight in the range of from 50 to 180 kg/mole, while the resinous blocks A' shown an true molecular weight in the range of from 3 to 20 kg/mole;</p>	<p>Under Paragraph 19, page 2, lines 1-14; Paragraph 20, page 2, lines 1-5; Paragraph 49, page 2, lines 1-7</p>
<p>(c) is a linear crystalline polymer comprising propylene as major component, with a Vicat softening temperature in the range of from 130°C to 180°C and a MFR in the range of from 0.5 to 30 dg/min and a polydispersity index of at least 4.5; and</p>	<p>Under Paragraph 48, page 4, lines 1-6; Paragraph 49, page 4, lines 1-7</p>

(d) a softener compatible with blocks B and B'	Under Paragraph 21, page 2, lines 1-2
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Grounds of Rejection to be Reviewed on Appeal

- Claims 13 – 25 are rejected under 35 USC § 103 as unpatentable over Mariotti in view of Nakagawa et al as evidence by Kolarik.
- Claims 13 – 25 are rejected under 35 USC § 103 as being unpatentable over Himes et al in view of Leicht and Mariotti.
- Claims 13 – 25 are rejected under 35 USC § 103 as unpatentable over Himes in view of Burnell and Mariotti.
- Claim 26 is rejected under 35 USC § 103 as being unpatentable over Burnell in view of Himes.

Argument

Rejection of Claims 13-25 under 35 USC § 103 over Mariotti in view of Nakagawa et al and Kolarik

The Examiner has rejected Claims 13 – 25 under 35 USC § 103 as unpatentable over Mariotti in view of Nakagawa et al (Nakagawa) as evidenced by Kolarik.

Mariotti teaches a process for making foamed thermoplastic elastomeric material for corks or closures for containers in substitution of natural cork. The process involves mixing a first component formed of a thermoplastic elastomeric compound and a second component formed of a thermoplastic elastomeric compound, which contains at least one foaming agent. Mariotti fails to specify molecular weights, the amount of styrene and the ratio between the high molecular components and the medium molecular weight components.

Nakagawa discloses a polyphenylene ether composition that has an excellent appearance when it is extruded into a molded piece at a high output, the composition retains its impact strength after heat exposure, and the composition has less foreign matter generation at the time of production. The thermoplastic resin includes a polyamide, a polyphenylene ether, and a block copolymer. The block copolymer includes at least one polymer block comprised of an aromatic vinyl compound and at least one polymer block comprised of a conjugated diene.

Kolarik is an article titled “Non-linear tensile creep of polypropylene: Time-strain superposition and creep prediction.” The Examiner relies upon the Kolarik article for the disclosure of a polypropylene homopolymer comprising Moplen C30G in a range between 40-80 phr. The Examiner merely plays lip service to Kolarik, but it appears the Examiner cites Kolarik solely in a futile attempt to support the Examiner’s unpersuasive argument that it is obvious to choose a particular Moplen trademarked product based upon the desired needs. In other words, the Examiner believes the substitution of one Moplen trademarked product for another is a “substitution of an equivalent.” Advisory

Action p. 3. However, all products under the Moplen trademark do not have the same or similar properties, and these properties change when combined with other block copolymers and other components. In fact, there are more than 70 grades of Moplen products that are homopolymer or copolymer polypropylene.

The examiner relies upon Nakagawa for teaching a thermoplastic composition where high impact strength decreases when only low molecular weight block copolymers or only high molecular weight block copolymers are used in a thermoplastic composition. Advisory Action p. 5. The Examiner asserts that it would be obvious to one of ordinary skill in the art to combine the low molecular weight block copolymer and high molecular weight block copolymer to obtain the desired physical properties, including tensile strength and surface appearance. The Examiner relies upon *In re Boesch* to provide support for this statement. It is respectfully submitted that *In re Boesch* does not stand for the proposition the Examiner asserts. The ranges in the prior art and the claims overlapped in *In re Boesch*, which is entirely different than the present case. There is no overlap in the present case because neither Mariotti nor Nakagawa disclose a ratio between high molecular weight components and medium weight components.

Nakagawa relates to polyphenylene ether compositions and fails to mention medium molecular weight components. The Examiner incorrectly assumes that high and low molecular weight block copolymers of Nakagawa would yield excellent surface appearance, high impact strength, and decrease in the generation of foreign matter at the time of production in the polypropylene composition of Mariotti. There is simply no basis or support for this position. In fact, the failure to use the proper combination of high and medium molecular weight block copolymers will result in a composition that is either too high in hardness, or bad heat resistance, as set forth in paragraphs 4 and 5 of the present invention.

The Examiner claims that it would have been obvious to choose the particular Kraton product according to particular needs. Advisory Action p. 3. It should be noted that not all products under the Kraton trademark have the same or similar properties, and

these properties change when combined with other block copolymers and other components. The same holds true for the products under the Moplen trademark that is cited in Kolarik and Mariotti and relied upon by the Examiner. Therefore, it would not be obvious for one skilled in the art to select a particular Kraton G or Moplen product to produce the present invention.

The Examiner's assumption that high and low molecular weight block copolymers of Nakagawa would yield excellent surface appearance, high impact strength, and decrease in the generation of foreign matter at the time of production in the polypropylene composition of Mariotti is incorrect. Mariotti does not attempt to solve high temperature resistance; instead, Mariotti is concerned with high hardness with a high polyolefin content, as one would expect with cork or other closure for a container. This point is buttressed by the fact that all examples in Mariotti show a hardness above 68 Shore A. Mariotti never presents the combination of a high molecular weight block copolymer and a medium weight block copolymer as required by Claims 13 and 25. Instead, Mariotti uses a significant amount of low melting point polyolefin without temperature resistance, thus causing a high compression set at high temperature, meaning poor high temperature performance.

Mariotti uses a 50/50 ratio of high and low molecular weight block copolymers as shown in Tables 3 and 4. The ratio of medium molecular weight block copolymers to high molecular weight block copolymer of the present invention is less than that disclosed in Mariotti. Further, Mariotti discloses a 50 phr oil content, which is lower than the oil content of the present invention and claimed in component (f) of Claim 13 and component (d) of Claim 25.

The Appellant has excluded low melting point/vicat softening temperature polyolefins from the present invention due to its poor temperature resistance. For Example, Mariotti uses EVA and Advlex that have a vicat softening temperature of 55°C. The present invention claims a Vicat softening temperature in the range of from 130°C to 180°C as claimed in component (c) of Claims 13 and 25.

2. Rejection of Claims 13-25 under 35 USC § 103 over Himes et al in view of Leicht and Mariotti

The examiner has rejected claims 13 – 25 under 35 USC § 103 as being unpatentable over Himes et al (Himes) in view of Leicht and Mariotti. Himes pertains to copolymer blends with improved oil absorption resistance. The thermoplastic blend comprises an elastomeric block copolymer of the general configuration A-B-A. The A block is a polymerized monoalkenyl aromatic hydrocarbon and each B block is a non-hydrogenated butadiene hydrocarbon block. The examiner seeks to combine this reference with Leicht and Mariotti which are concerned with foam compositions.

Leicht discloses thermally applied sealants and processes for use in foaming operations. The elastomeric compositions in Leicht are composed of at least two thermoplastic rubber compounds, a nucleating agent, and an unstable detackifying resin. The composition is then foamed for use in applications. One way the composition is foamed is through the use of blowing agents.

Mariotti teaches a process for making foamed thermoplastic elastomeric material for making corks or closures for containers in substitution of natural cork. The process involves mixing a first component formed of a thermoplastic elastomeric compound and a second component formed of a thermoplastic elastomeric compound, which contains at least one foaming agent.

The Examiner believes that since Mariotti uses block copolymers trademarked under the Kraton name and Moplen name it would have been obvious to choose the particular Kraton or Moplen product according to particular needs. There are many different and diverse uses of styrene block copolymers (even those trademarked Kraton and Moplen) and those skilled in the art recognize this fact. Not all products under the Kraton or Moplen trademark have the same or similar properties, and these properties change when combined with other block copolymers and other components. Therefore, it

would not be obvious for one skilled in the art to select a particular Kraton G or Moplen product to produce the present invention as claimed in Claims 13 and 25.

Additionally, the combination of Himes with Leicht and Mariotti would destroy Himes' oil absorption resistance. Himes discloses many uses in Column 3 and none of these uses relates to foam. Instead of resisting the absorption of oil, the addition of foam to Himes would increase oil absorption, which teaches away from the present invention. In other words, the addition of Leicht and Mariotti would increase oil absorption, which teaches away from the present invention.

3. Rejection of Claims 13-25 under 35 USC § 103 over Himes in view of Burnell and Mariotti

The Examiner has rejected claims 13 – 25 under 35 USC § 103 as unpatentable over Himes in view of Burnell and Mariotti. Himes pertains to copolymer blends with improved oil absorption resistance. The thermoplastic blend generally comprises an elastomeric block copolymer of the general configuration A-B-A. The A block is a polymerized monoalkenyl aromatic hydrocarbon and each B block is a non-hydrogenated butadiene hydrocarbon block. The examiner seeks to combine this reference with Burnell and Mariotti which are concerned with foam compositions.

Burnell discloses a blowing agent concentrate and compositions prepared therefrom. The compositions of Burnell include a vinyl aromatic polymer, a preformed blend of a styrene/diene block copolymer and a hydrocarbon rubber extending oil, and at least one blowing agent.

Mariotti teaches a process for making foamed thermoplastic elastomeric material for making corks or closures for containers in substitution of natural cork. The process involves missing a first component formed of a thermoplastic elastomeric compound and a second component formed of a thermoplastic elastomeric compound, which contains as least one foaming agent.

The Examiner believes that since Mariotti uses block copolymers trademarked under the Kraton name and Moplen name it would have been obvious to choose the particular Kraton or Moplen product according to particular needs. The Examiner claims the substitution of one Kraton or Moplen product for another is a “substitution of an equivalent.” It should be noted that not all products under the Kraton and Moplen trademark have the same or similar properties, and these properties change when combined with other block copolymers and other components. The same holds true for the products under the Moplen trademark. Therefore, it would not be obvious for one skilled in the art to select a particular Kraton G or Moplen product to produce the present invention as claimed in Claims 13 and 25. This blanket and unfounded argument by the Examiner is misplaced.

Additionally, the combination of Himes with Burnell and Mariotti would destroy Himes’ oil absorption resistance. Himes discloses many uses in Column 3 and none of these uses relates to foam. Instead of resisting the absorption of oil, the addition of foam to Himes would increase oil absorption, which teaches away from the present invention. In other words, the addition of Burnell and Mariotti would increase oil absorption, which teaches away from the present invention.

4. Rejection of Claim 26 under 35 USC § 103 over Burnell in view of Himes

The Examiner rejects claim 26 under 35 USC § 103 as being unpatentable over Burnell in view of Himes. Himes pertains to copolymer blends with improved oil absorption resistance. The thermoplastic blend generally comprises an elastomeric block copolymer of the general configuration A-B-A. The A block is a polymerized monoalkenyl aromatic hydrocarbon and each B block is a non-hydrogenated butadiene hydrocarbon block. The examiner seeks to combine this reference with Burnell which is concerned with foam compositions.

Burnell discloses a blowing agent concentrate and compositions prepared therefrom. The compositions of Burnell include a vinyl aromatic polymer, a preformed blend of a styrene/diene block copolymer and a hydrocarbon rubber extending oil, and at least one blowing agent.

Consequently, it is respectfully submitted that Himes is not analogous art and thus not properly combinable with Burnell. The Examiner claims Himes teaches a pre-blend that can be used with the blowing agent of Burnell, which if occurs, would destroy Himes' oil absorption resistance. The addition of foam to Himes would increase oil absorption.

The examiner asserts that Himes describes a blend of Kraton G, oil and a polyolefin, which is not a reason to combine the references. The use of Himes and Burnell are not the same as indicated in Column 3 of Himes. Again, there is no teaching or suggestion of substituting the styrene block copolymers of Himes for those in Burnell would result a foamable composition. The combination of these two references relies upon impermissible hindsight reasoning.

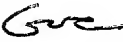
Reversal of the rejection is courteously solicited.

SUMMARY

For the reasons presented above, Appellant believes that all claims under appeal are novel and non-obvious over the art, and respectfully request that the outstanding rejections under 35 U.S.C. 103(a) be reversed by the Board.

Respectfully submitted,

Date: September 16, 2010

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Claims Appendix

The claims on appeal appear as follows:

13. Foamable compositions which are usable for the manufacture of foamed, flexible, heat resistant, thermoplastic elastomeric articles, and which comprise at least:

(a) 100 parts by weight of one or more selectively hydrogenated block copolymers, having at least two resinous blocks A of non-hydrogenated predominantly polymerized monovinyl arene, and a selectively hydrogenated elastomeric block B, wherein said block B prior to hydrogenation being predominantly a polymerized conjugated diene of polybutadiene, said block copolymer having a total apparent molecular weight of at least 250 kg/mole, and containing polymerized monovinyl arene blocks of true molecular weight of at least 18 kg/mole,

(b) 5 to 50 parts by weight of one or more selectively hydrogenated block copolymers having at least two resinous blocks A' of non-hydrogenated predominantly polymerized monovinyl arene, and an selectively hydrogenated elastomeric block B', wherein said block B' prior to hydrogenation has been derived from a polymerized conjugated diene or dienes as a major component which may be mixed with minor proportions of other copolymers (e.g. vinyl aromatic) i.e. ≤ 25 wt%, and said block copolymer having a total apparent molecular weight in the range of from 50 to 180 kg/mole, while the resinous blocks A' shown an true molecular weight in the range of from 3 to 20 kg/mole,

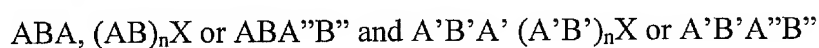
(c) from 25 to 80 parts by weight of a linear crystalline polymer comprising propylene as major component, with a Vicat softening temperature in the range of from 130°C to 180°C and a MFR in the range of from 0.5 to 30 dg/min and a polydispersity index of at least 4.5,

(d) from 100 to 250 parts by weight of a softener compatible with blocks B and B',

(e) from 0.01 to 3 wt%, relative to the weight of the primary components (a) up to (e) of a solid chemical nucleating agent of the endothermic group in combination with a blowing agent, and optionally

(f) one or more secondary components selected from PPO and/or any resins compatible with block copolymer component (a), antioxidants, UV-stabilizers, flame retardants, surface modifying agents and inorganic fillers.

14. The foamable compositions of claim 13, which comprise as components (a) and (b) at least one block copolymers of the general formulae



respectively, wherein A, A' and A'' represent a poly(monovinyl arene) block and B, B' and B'' represent a hydrogenated poly(conjugated diene(s)) block, wherein n is an integer ≥ 2 and wherein X is the remainder of a coupling agent, wherein the blocks A, A' and A'' are different and the blocks A are larger than the blocks A', which are in turn larger than A'', while the blocks B and B' are larger than B''.

15. The foamable compositions of claim 14, wherein the block copolymer component (a) has the formula ABA or (AB)_nX, has a total apparent molecular weight in the range of from 250,000 to 600,000, wherein A represents a substantially pure poly(styrene) block and wherein the poly(styrene) block content in said block copolymer (a) is in the range of from 20 to 35 wt% and wherein B represents a hydrogenated poly(butadiene) block.

16. The foamable compositions of claim 14, wherein the block copolymer component (b) has the formula A'B'A' or (A'B')_nX, has a total apparent molecular weight in the range of from 80 to 160 kg/mole, wherein A' represents a substantially pure poly(styrene) block, each having a molecular weight in the range of from 5 to 15 kg/mole.

17. The foamable compositions of claim 13, wherein the weight ratio between the block copolymer components (a) and (b) is in the range of from 10 to 40 parts by weight of component (b) per 100 parts by weight of component (a).

18. The foamable compositions of claim 13, wherein component (c) is a single polymer or a mixture of polymers predominantly composed of propylene monomer or a copolymer of predominantly propylene with a minor proportion of a different alkylene selected from ethylene or butylenes, i.e. less than 25 wt% of the monomer mixture.
19. The foamable compositions of claim 18, wherein component (c) has a melt flow range between 2 and 15 dg/min at 230°C/2.16 kg, a Vicat softening temperature in the range of from 130 to 170°C, and occurs in a weight ratio of from 42 to 65 parts by weight of (c) per 100 parts by weight of (a).
20. The foamable compositions of claim 19, wherein the component (c) shows a polydispersity index ≥ 5 .
21. The foamable compositions of claim 13, wherein component (d) is a paraffinic oil.
22. The foamable compositions of claim 13, wherein component (e) is selected from mixtures of NaHCO_3 and citric acid or sodium citrate, on amounts of from 0.5 to 1 wt%, relative to the weight of components (a) up through (e).
23. The foamable compositions of claim 14, wherein
- i) the block copolymer component (a) has the formula ABA or $(\text{AB})_n\text{X}$, has a total apparent molecular weight in the range of from 250,000 to 600,000, wherein A represents a substantially pure poly(styrene) block and wherein the poly(styrene) block content in said block copolymer (a) is in the range of from 20 to 35 wt% and wherein B represents a hydrogenated poly(butadiene) block;
 - ii) the weight ratio between the block copolymer components (a) and (b) is in the range of from 10 to 40 parts by weight of component (b) per 100 parts by weight of component (a);
 - iii) component (c) is a single polymer or a mixture of polymers predominantly composed of propylene monomer or a compolymer of predominantly propylene with a

minor proportion of a different alkylene selected from ethylene or butylenes, having a melt flow range between 2 and 15 dg/min at 230°C/2/16 kg, a Vicat softening temperature in the range of from 130 to 170°C, and occurs in a weight ratio of from 42 to 65 parts by weight of (c) per 100 parts by weight of (a);

iv) component (d) is a paraffinic oil; and

v) component (e) is selected from mixtures of NaHCO₃ and citric acid or sodium citrate, on amounts of from 0.5 to 1 wt%, relative to the weight of components (a) through (e).

24. The foamable compositions of claim 14, wherein

i) the block copolymer component (b) has the formula A'B'A' or (A'B')_nX, has a total apparent molecular weight in the range of from 80 to 160 kg/mole, wherein A' represents a substantially pure poly(styrene) block, each having a molecular weight in the range of from 5 to 15 kg/mole;

ii) the weight ratio between the block copolymer components (a) and (b) is in the range of from 10 to 40 parts by weight of component (b) per 100 parts by weight of component (a);

iii) component (c) is a single polymer or a mixture of polymers predominantly composed of propylene monomer or a copolymer of predominantly propylene with a minor proportion of a different alkylene selected from ethylene or butylenes, having a melt flow range between 2 and 15 dg/min at 230°C/2/16 kg, a Vicat softening temperature in the range of from 130 to 170°C, and occurs in a weight ratio of from 42 to 65 parts by weight of (c) per 100 parts by weight of (a);

iv) component (d) is a paraffinic oil; and

v) component (e) is selected from mixtures of NaHCO₃ and citric acid or sodium citrate, on amounts of from 0.5 to 1 wt%, relative to the weight of components (a) through (e).

25. Foamed articles comprising

(a) 100 parts by weight of one or more selectively hydrogenated block copolymers, having at least two resinous blocks A of non-hydrogenated predominantly

polymerized monovinyl arene, and a selectively hydrogenated elastomeric block B, wherein said block B prior to hydrogenation being predominantly a polymerized conjugated diene of polybutadiene, said block copolymer having a total apparent molecular weight of at least 250 kg/, and containing polymerized monovinyl arene blocks of true molecular weight of at least 18 kg/mole,

(b) 5 to 50 parts by weight of one or more selectively hydrogenated block copolymers having at least two resinous blocks A' of non-hydrogenated predominantly polymerized monovinyl arene, and an selectively hydrogenated elastomeric block B', wherein said block B' prior to hydrogenation has been derived from a polymerized conjugated diene or dienes as a major component which may be mixed with minor proportions of other copolymers (e.g. vinyl aromatic) i.e. ≤ 25 wt%, and said block copolymer having a total apparent molecular weight in the range of from 50 to 180 kg/mole, while the resinous blocks A' shown an true molecular weight in the range of from 3 to 20 kg/mole,

(c) from 25 to 80 parts by weight of a linear crystalline polymer comprising propylene as major component, with a Vicat softening temperature in the range of from 130°C to 180°C and a MFR in the range of from 0.5 to 30 dg/min and a polydispersity index of at least 4.5,

(d) from 100 to 250 parts by weight of a softener compatible with blocks B and B',

(e) from 0.01 to 3 wt%, relative to the weight of the primary components (a) up to (e) of a solid chemical nucleating agent of the endothermic group in combination with a blowing agent, and optionally

(f) one or more secondary components selected from PPO and/or any resins compatible with block copolymer component (a), antioxidants, UV-stabilizers, flame retardants, surface modifying agents and inorganic fillers.

26. Pre-blends for the preparation of the foamable compositions of claim 13, comprising either:

(A) components (a), (c) and (d) wherein (a) is one or more selectively hydrogenated block copolymers, having at least two resinous blocks A of non-

hydrogenated predominantly polymerized monovinyl arene, and a selectively hydrogenated elastomeric block B, wherein said block B prior to hydrogenation being predominantly a polymerized conjugated diene of polybutadiene, said block copolymer having a total apparent molecular weight of at least 250 kg/mole, and containing polymerized monovinyl arene blocks of true molecular weight of at least 18 kg/mole; (c) is a linear crystalline polymer comprising propylene as major component, with a Vicat softening temperature in the range of from 130°C to 180°C and a MFR in the range of from 0.5 to 30 dg/min and a polydispersity index of at least 4.5; and (d) a softener compatible with blocks B and B'; or

(B) components (b), (c) and/or (d) wherein (b) is one or more selectively hydrogenated block copolymers having at least two resinous blocks A' of non-hydrogenated predominantly polymerized monovinyl arene, and an selectively hydrogenated elastomeric block B', wherein said block B' prior to hydrogenation has been derived from a polymerized conjugated diene or dienes as a major component which may be mixed with minor proportions of other copolymers (e.g. vinyl aromatic) i.e. ≤ 25 wt%, and said block copolymer having a total apparent molecular weight in the range of from 50 to 180 kg/mole, while the resinous blocks A' shown an true molecular weight in the range of from 3 to 20 kg/mole; (c) is a linear crystalline polymer comprising propylene as major component, with a Vicat softening temperature in the range of from 130°C to 180°C and a MFR in the range of from 0.5 to 30 dg/min and a polydispersity index of at least 4.5; and (d) a softener compatible with blocks B and B'.

Evidence Appendix

None

Related Proceedings Appendix

None